

10/553703

JC09 Rec'd PCT/PTO 18 OCT 2009

SEQUENCE LISTING

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<120> HLA-A2 Tumor Associated Antigen Peptides and Compositions

<130> 2060.015PC07

<140> PCT/US2004/011895

<141> 2004-04-16

<150> US 60/463,724

<151> 2003-04-18

<160> 42

<170> PatentIn version 3.3

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<222> (1)..(1)
<223> Ala is D-alanine.

<220>
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<222> (3)..(3)
<223> Xaa is cyclohexylalanine.

<220>
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<222> (13)..(13)
<223> Ala is D-alanine.

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Ala Lys Xaa Val Ala Ala Trp Thr Leu Lys Ala Ala Ala
1 5 10

<210> 2
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<400> 2

Arg Leu Leu Gln Glu Thr Glu Leu Val
1 5

<210> 3

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<400> 3

Tyr Leu Gln Leu Val Phe Gly Ile Glu Val
 1 5 10

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<400> 4

Leu Leu Thr Phe Trp Asn Pro Pro Val
 1 5

<210> 5
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<400> 5

Ser Met Pro Pro Pro Gly Thr Arg Val
 1 5

<210> 6
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 <222> (3)..(3)
 <223> Xaa is alpha-aminoisobutyric acid.

<400> 6

Lys Leu Xaa Pro Val Gln Leu Trp Val
 1 5

<210> 7
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<400> 7

Lys Val Phe Gly Ser Leu Ala Phe Val
 1 5

<210> 8

<211> 9
 <212> PRT
 <213> Mus sp.

<400> 8

Tyr Leu Ser Gly Ala Asp Leu Asn Leu
 1 5

<210> 9
 <211> 9
 <212> PRT
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<400> 9

Ile Met Ile Gly His Leu Val Gly Val
 1 5

<210> 10
 <211> 9
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<400> 10

Lys Val Ala Glu Ile Val His Phe Leu
 1 5

<210> 11
 <211> 702
 <212> PRT
 <213> Mus sp.

<400> 11

Met Glu Ser Pro Ser Ala Pro Pro His Arg Trp Cys Ile Pro Trp Gln
 1 5 10 15

Arg Leu Leu Leu Thr Ala Ser Leu Leu Thr Phe Trp Asn Pro Pro Thr
 20 25 30

Thr Ala Lys Leu Thr Ile Glu Ser Thr Pro Phe Asn Val Ala Glu Gly
 35 40 45

Lys Glu Val Leu Leu Leu Val His Asn Leu Pro Gln His Leu Phe Gly
 50 55 60

Tyr Ser Trp Tyr Lys Gly Glu Arg Val Asp Gly Asn Arg Gln Ile Ile
 65 70 75 80

Gly Tyr Val Ile Gly Thr Gln Gln Ala Thr Pro Gly Pro Ala Tyr Ser
 85 90 95

Gly Arg Glu Ile Ile Tyr Pro Asn Ala Ser Leu Leu Ile Gln Asn Ile
 100 105 110

Ile Gln Asn Asp Thr Gly Phe Tyr Thr Leu His Val Ile Lys Ser Asp
 115 120 125

Leu Val Asn Glu Glu Ala Thr Gly Gln Phe Arg Val Tyr Pro Glu Leu
 130 135 140

Pro Lys Pro Ser Ile Ser Ser Asn Asn Ser Lys Pro Val Glu Asp Lys
 145 150 155 160

Asp Ala Val Ala Phe Thr Cys Glu Pro Glu Thr Gln Asp Ala Thr Tyr
 165 170 175

Leu Trp Trp Val Asn Asn Gln Ser Leu Pro Val Ser Pro Arg Leu Gln
 180 185 190

Leu Ser Asn Gly Asn Arg Thr Leu Thr Leu Phe Asn Val Thr Arg Asn
 195 200 205

Asp Thr Ala Ser Tyr Lys Cys Glu Thr Gln Asn Pro Val Ser Ala Arg
 210 215 220

Arg Ser Asp Ser Val Ile Leu Asn Val Leu Tyr Gly Pro Asp Ala Pro
 225 230 235 240

Thr Ile Ser Pro Leu Asn Thr Ser Tyr Arg Ser Gly Glu Asn Leu Asn
 245 250 255

Leu Ser Cys His Ala Ala Ser Asn Pro Pro Ala Gln Tyr Ser Trp Phe
 260 265 270

Val Asn Gly Thr Phe Gln Gln Ser Thr Gln Glu Leu Phe Ile Pro Asn
 275 280 285

Ile Thr Val Asn Asn Ser Gly Ser Tyr Thr Cys Gln Ala His Asn Ser
 290 295 300

Asp Thr Gly Leu Asn Arg Thr Thr Val Thr Thr Ile Thr Val Tyr Ala
 305 310 315 320

Glu Pro Pro Lys Pro Phe Ile Thr Ser Asn Asn Ser Asn Pro Val Glu
 325 330 335

Asp Glu Asp Ala Val Ala Leu Thr Cys Glu Pro Glu Ile Gln Asn Thr
 340 345 350

Thr Tyr Leu Trp Trp Val Asn Asn Gln Ser Leu Pro Val Ser Pro Arg
 355 360 365

Leu Gln Leu Ser Asn Asp Asn Arg Thr Leu Thr Leu Leu Ser Val Thr
 370 375 380

Arg Asn Asp Val Gly Pro Tyr Glu Cys Gly Ile Gln Asn Glu Leu Ser
 385 390 395 400

Val Asp His Ser Asp Pro Val Ile Leu Asn Val Leu Tyr Gly Pro Asp
 405 410 415

Asp Pro Thr Ile Ser Pro Ser Tyr Thr Tyr Tyr Arg Pro Gly Val Asn
 420 425 430

Leu Ser Leu Ser Cys His Ala Ala Ser Asn Pro Pro Ala Gln Tyr Ser
 435 440 445

Trp Leu Ile Asp Gly Asn Ile Gln Gln His Thr Gln Glu Leu Phe Ile
 450 455 460

Ser Asn Ile Thr Glu Lys Asn Ser Gly Leu Tyr Thr Cys Gln Ala Asn
 465 470 475 480

Asn Ser Ala Ser Gly His Ser Arg Thr Thr Val Lys Thr Ile Thr Val
 485 490 495

Ser Ala Glu Leu Pro Lys Pro Ser Ile Ser Ser Asn Asn Ser Lys Pro
 500 505 510

Val Glu Asp Lys Asp Ala Val Ala Phe Thr Cys Glu Pro Glu Ala Gln
 515 520 525

Asn Thr Thr Tyr Leu Trp Trp Val Asn Gly Gln Ser Leu Pro Val Ser
 530 535 540

Pro Arg Leu Gln Leu Ser Asn Gly Asn Arg Thr Leu Thr Leu Phe Asn
 545 550 555 560

Val Thr Arg Asn Asp Ala Arg Ala Tyr Val Cys Gly Ile Gln Asn Ser
 565 570 575

Val Ser Ala Asn Arg Ser Asp Pro Val Thr Leu Asp Val Leu Tyr Gly
580 585 590

Pro Asp Thr Pro Ile Ile Ser Pro Pro Asp Ser Ser Tyr Leu Ser Gly
595 600 605

Ala Asn Leu Asn Leu Ser Cys His Ser Ala Ser Asn Pro Ser Pro Gln
610 615 620

Tyr Ser Trp Arg Ile Asn Gly Ile Pro Gln Gln His Thr Gln Val Leu
625 630 635 640

Phe Ile Ala Lys Ile Thr Pro Asn Asn Asn Gly Thr Tyr Ala Cys Phe
645 650 655

Val Ser Asn Leu Ala Thr Gly Arg Asn Asn Ser Ile Val Lys Ser Ile
660 665 670

Thr Val Ser Ala Ser Gly Thr Ser Pro Gly Leu Ser Ala Gly Ala Thr
675 680 685

Val Gly Ile Met Ile Gly Val Leu Val Gly Val Ala Leu Ile
690 695 700

<210> 12
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<213> Mus sp.

<400> 12

Met Glu Leu Ala Ala Leu Cys Arg Trp Gly Leu Leu Leu Ala Leu Leu
1 5 10 15

Pro Pro Gly Ala Ala Ser Thr Gln Val Cys Thr Gly Thr Asp Met Lys
20 25 30

Leu Arg Leu Pro Ala Ser Pro Glu Thr His Leu Asp Met Leu Arg His
35 40 45

Leu Tyr Gln Gly Cys Gln Val Val Gln Gly Asn Leu Glu Leu Thr Tyr
50 55 60

Leu Pro Thr Asn Ala Ser Leu Ser Phe Leu Gln Asp Ile Gln Glu Val
65 70 75 80

Gln Gly Tyr Val Leu Ile Ala His Asn Gln Val Arg Gln Val Pro Leu
85 90 95

Gln Arg Leu Arg Ile Val Arg Gly Thr Gln Leu Phe Glu Asp Asn Tyr
 100 105 110

Ala Leu Ala Val Leu Asp Asn Gly Asp Pro Leu Asn Asn Thr Thr Pro
 115 120 125

Val Thr Gly Ala Ser Pro Gly Gly Leu Arg Glu Leu Gln Leu Arg Ser
 130 135 140

Leu Thr Glu Ile Leu Lys Gly Gly Val Leu Ile Gln Arg Asn Pro Gln
 145 150 155 160

Leu Cys Tyr Gln Asp Thr Ile Leu Trp Lys Asp Ile Phe His Lys Asn
 165 170 175

Asn Gln Leu Ala Leu Thr Leu Ile Asp Thr Asn Arg Ser Arg Ala Cys
 180 185 190

His Pro Cys Ser Pro Met Cys Lys Gly Ser Arg Cys Trp Gly Glu Ser
 195 200 205

Ser Glu Asp Cys Gln Ser Leu Thr Arg Thr Val Cys Ala Gly Gly Cys
 210 215 220

Ala Arg Cys Lys Gly Pro Leu Pro Thr Asp Cys Cys His Glu Gln Cys
 225 230 235 240

Ala Ala Gly Cys Thr Gly Pro Lys His Ser Asp Cys Leu Ala Cys Leu
 245 250 255

His Phe Asn His Ser Gly Ile Cys Glu Leu His Cys Pro Ala Leu Val
 260 265 270

Thr Tyr Asn Thr Asp Thr Phe Glu Ser Met Pro Asn Pro Glu Gly Arg
 275 280 285

Tyr Thr Phe Gly Ala Ser Cys Val Thr Ala Cys Pro Tyr Asn Tyr Leu
 290 295 300

Ser Thr Asp Val Gly Ser Cys Thr Leu Val Cys Pro Leu His Asn Gln
 305 310 315 320

Glu Val Thr Ala Glu Asp Gly Thr Gln Arg Cys Glu Lys Cys Ser Lys
 325 330 335

Pro Cys Ala Arg Val Cys Tyr Gly Leu Gly Met Glu His Leu Arg Glu
 340 345 350

Val Arg Ala Val Thr Ser Ala Asn Ile Gln Glu Phe Ala Gly Cys Lys
 355 360 365

Lys Ile Phe Gly Ser Leu Ala Phe Leu Pro Glu Ser Phe Asp Gly Asp
 370 375 380

Pro Ala Ser Asn Thr Ala Pro Leu Gln Pro Glu Gln Leu Gln Val Phe
 385 390 395 400

Glu Thr Leu Glu Glu Ile Thr Gly Tyr Leu Tyr Ile Ser Ala Trp Pro
 405 410 415

Asp Ser Leu Pro Asp Leu Ser Val Phe Gln Asn Leu Gln Val Ile Arg
 420 425 430

Gly Arg Ile Leu His Asn Gly Ala Tyr Ser Leu Thr Leu Gln Gly Leu
 435 440 445

Gly Ile Ser Trp Leu Gly Leu Arg Ser Leu Arg Glu Leu Gly Ser Gly
 450 455 460

Leu Ala Leu Ile His His Asn Thr His Leu Cys Phe Val His Thr Val
 465 470 475 480

Pro Trp Asp Gln Leu Phe Arg Asn Pro His Gln Ala Leu Leu His Thr
 485 490 495

Ala Asn Arg Pro Glu Asp Glu Cys Val Gly Glu Gly Leu Ala Cys His
 500 505 510

Gln Leu Cys Ala Arg Gly His Cys Trp Gly Pro Gly Pro Thr Gln Cys
 515 520 525

Val Asn Cys Ser Gln Phe Leu Arg Gly Gln Glu Cys Val Glu Glu Cys
 530 535 540

Arg Val Leu Gln Gly Leu Pro Arg Glu Tyr Val Asn Ala Arg His Cys
 545 550 555 560

Leu Pro Cys His Pro Glu Cys Gln Pro Gln Asn Gly Ser Val Thr Cys
 565 570 575

Phe Gly Pro Glu Ala Asp Gln Cys Val Ala Cys Ala His Tyr Lys Asp
 580 585 590

Pro Pro Phe Cys Val Ala Arg Cys Pro Ser Gly Val Lys Pro Asp Leu
 595 600 605

Ser Tyr Met Pro Ile Trp Lys Phe Pro Asp Glu Glu Gly Ala Cys Gln
 610 615 620

Pro Cys Pro Ile Asn Cys Thr His Ser Cys Val Asp Leu Asp Asp Lys
 625 630 635 640

Gly Cys Pro Ala Glu Gln Arg Ala Ser Pro Leu Thr Ser Ile Ile Ser
 645 650 655

Ala Val Val Gly Ile Leu Leu Val Val Val Leu Gly Val Val Phe Gly
 660 665 670

Ile Leu Ile Lys Arg Arg Gln Gln Lys Ile Arg Lys Tyr Thr Met Arg
 675 680 685

Arg Leu Leu Gln Glu Thr Glu Leu Val Glu Pro Leu Thr Pro Ser Gly
 690 695 700

Ala Met Pro Asn Gln Ala Gln Met Arg Ile Leu Lys Glu Thr Glu Leu
 705 710 715 720

Arg Lys Val Lys Val Leu Gly Ser Gly Ala Phe Gly Thr Val Tyr Lys
 725 730 735

Gly Ile Trp Ile Pro Asp Gly Glu Asn Val Lys Ile Pro Val Ala Ile
 740 745 750

Lys Val Leu Arg Glu Asn Thr Ser Pro Lys Ala Asn Lys Glu Ile Leu
 755 760 765

Asp Glu Ala Tyr Val Met Ala Gly Val Gly Ser Pro Tyr Val Ser Arg
 770 775 780

Leu Leu Gly Ile Cys Leu Thr Ser Thr Val Gln Leu Val Thr Gln Leu
 785 790 795 800

Met Pro Tyr Gly Cys Leu Leu Asp His Val Arg Glu Asn Arg Gly Arg
 805 810 815

Leu Gly Ser Gln Asp Leu Leu Asn Trp Cys Met Gln Ile Ala Lys Gly

820	825	830
Met Ser Tyr Leu Glu Asp Val Arg Leu Val His Arg Asp Leu Ala Ala		
835	840	845
Arg Asn Val Leu Val Lys Ser Pro Asn His Val Lys Ile Thr Asp Phe		
850	855	860
Gly Leu Ala Arg Leu Leu Asp Ile Asp Glu Thr Glu Tyr His Ala Asp		
865	870	875
Gly Gly Lys Val Pro Ile Lys Trp Met Ala Leu Glu Ser Ile Leu Arg		
885	890	895
Arg Arg Phe Thr His Gln Ser Asp Val Trp Ser Tyr Gly Val Thr Val		
900	905	910
Trp Glu Leu Met Thr Phe Gly Ala Lys Pro Tyr Asp Gly Ile Pro Ala		
915	920	925
Arg Glu Ile Pro Asp Leu Leu Glu Lys Gly Glu Arg Leu Pro Gln Pro		
930	935	940
Pro Ile Cys Thr Ile Asp Val Tyr Met Ile Met Val Lys Cys Trp Met		
945	950	955
Ile Asp Ser Glu Cys Arg Pro Arg Phe Arg Glu Leu Val Ser Glu Phe		
965	970	975
Ser Arg Met Ala Arg Asp Pro Gln Arg Phe Val Val Ile Gln Asn Glu		
980	985	990
Asp Leu Gly Pro Ala Ser Pro Leu Asp Ser Thr Phe Tyr Arg Ser Leu		
995	1000	1005
Leu Glu Asp Asp Asp Met Gly Asp Leu Val Asp Ala Glu Glu Tyr		
1010	1015	1020
Leu Val Pro Gln Gln Gly Phe Phe Cys Pro Asp Pro Ala Pro Gly		
1025	1030	1035
Ala Gly Gly Met Val His His Arg His Arg Ser Ser Ser Thr Arg		
1040	1045	1050
Ser Gly Gly Gly Asp Leu Thr Leu Gly Leu Glu Pro Ser Glu Glu		
1055	1060	1065

Glu Ala Pro Arg Ser Pro Leu Ala Pro Ser Glu Gly Ala Gly Ser
1070 1075 1080

Asp Val Phe Asp Gly Asp Leu Gly Met Gly Ala Ala Lys Gly Leu
1085 1090 1095

Gln Ser Leu Pro Thr His Asp Pro Ser Pro Leu Gln Arg Tyr Ser
1100 1105 1110

Glu Asp Pro Thr Val Pro Leu Pro Ser Glu Thr Asp Gly Tyr Val
1115 1120 1125

Ala Pro Leu Thr Cys Ser Pro Gln Pro Glu Tyr Val Asn Gln Pro
1130 1135 1140

Asp Val Arg Pro Gln Pro Pro Ser Pro Arg Glu Gly Pro Leu Pro
1145 1150 1155

Ala Ala Arg Pro Ala Gly Ala Thr Leu Glu Arg Pro Lys Thr Leu
1160 1165 1170

Ser Pro Gly Lys Asn Gly Val Val Lys Asp Val Phe Ala Phe Gly
1175 1180 1185

Gly Ala Val Glu Asn Pro Glu Tyr Leu Thr Pro Gln Gly Gly Ala
1190 1195 1200

Ala Pro Gln Pro His Pro Pro Pro Ala Phe Ser Pro Ala Phe Asp
1205 1210 1215

Asn Leu Tyr Tyr Trp Asp Gln Asp Pro Pro Glu Arg Gly Ala Pro
1220 1225 1230

Pro Ser Thr Phe Lys Gly Thr Pro Thr Ala Glu Asn Pro Glu Tyr
1235 1240 1245

Leu Gly Leu Asp Val Pro Val
1250 1255

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<211> 314
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<213> Mus sp.

<400> 13

Met Pro Leu Glu Gln Arg Ser Gln His Cys Lys Pro Glu Glu Gly Leu
1 5 10 15

Glu Ala Arg Gly Glu Ala Leu Gly Leu Val Gly Ala Gln Ala Pro Ala
20 25 30

Thr Glu Glu Gln Gln Thr Ala Ser Ser Ser Ser Thr Leu Val Glu Val
35 40 45

Thr Leu Gly Glu Val Pro Ala Ala Asp Ser Pro Ser Pro Pro His Ser
50 55 60

Pro Gln Gly Ala Ser Ser Phe Ser Thr Thr Ile Asn Tyr Thr Leu Trp
65 70 75 80

Arg Gln Ser Asp Glu Gly Ser Ser Asn Gln Glu Glu Glu Gly Pro Arg
85 90 95

Met Phe Pro Asp Leu Glu Ser Glu Phe Gln Ala Ala Ile Ser Arg Lys
100 105 110

Met Val Glu Leu Val His Phe Leu Leu Leu Lys Tyr Arg Ala Arg Glu
115 120 125

Pro Val Thr Lys Ala Glu Met Leu Glu Ser Val Leu Arg Asn Cys Gln
130 135 140

Asp Phe Phe Pro Val Ile Phe Ser Lys Ala Ser Glu Tyr Leu Gln Leu
145 150 155 160

Val Phe Gly Ile Glu Val Val Glu Val Val Pro Ile Ser His Leu Tyr
165 170 175

Ile Leu Val Thr Cys Leu Gly Leu Ser Tyr Asp Gly Leu Leu Gly Asp
180 185 190

Asn Gln Val Met Pro Lys Thr Gly Leu Leu Ile Ile Val Leu Ala Ile
195 200 205

Ile Ala Ile Glu Gly Asp Cys Ala Pro Glu Glu Lys Ile Trp Glu Glu
210 215 220

Leu Ser Met Leu Glu Val Phe Glu Gly Arg Glu Asp Ser Val Phe Ala
225 230 235 240

His Pro Arg Lys Leu Leu Met Gln Asp Leu Val Gln Glu Asn Tyr Leu

Tyr Phe Phe Pro Val Ile Phe Ser Lys Ala Ser Ser Ser Leu Gln Leu
145 150 155 160

Val Phe Gly Ile Glu Leu Met Glu Val Asp Pro Ile Gly His Leu Tyr
165 170 175

Ile Phe Ala Thr Cys Leu Gly Leu Ser Tyr Asp Gly Leu Leu Gly Asp
180 185 190

Asn Gln Ile Met Pro Lys Ala Gly Leu Leu Ile Ile Val Leu Ala Ile
195 200 205

Ile Ala Arg Glu Gly Asp Cys Ala Pro Glu Glu Lys Ile Trp Glu Glu
210 215 220

Leu Ser Val Leu Glu Val Phe Glu Gly Arg Glu Asp Ser Ile Leu Gly
225 230 235 240

Asp Pro Lys Lys Leu Leu Thr Gln His Phe Val Gln Glu Asn Tyr Leu
245 250 255

Glu Tyr Arg Gln Val Pro Gly Ser Asp Pro Ala Cys Tyr Glu/ Phe Leu
260 265 270

Trp Gly Pro Arg Ala Leu Val Glu Thr Ser Tyr Val Lys Val Leu His
275 280 285

His Met Val Lys Ile Ser Gly Gly Pro His Ile Ser Tyr Pro Pro Leu
290 295 300

His Glu Trp Val Leu Arg Glu Gly Glu Glu
305 310

<210> 15
<211> 393
<212> PRT
<213> Mus sp.

<400> 15

Met Glu Glu Pro Gln Ser Asp Pro Ser Val Glu Pro Pro Leu Ser Gln
1 5 10 15

Glu Thr Phe Ser Asp Leu Trp Lys Leu Leu Pro Glu Asn Asn Val Leu
20 25 30

Ser Pro Leu Pro Ser Gln Ala Met Asp Asp Leu Met Leu Ser Pro Asp

35	40	45
Asp Ile Glu Gln Trp Phe Thr Glu Asp Pro Gly Pro Asp Glu Ala Pro 50 55 60		
Arg Met Pro Glu Ala Ala Pro Pro Val Ala Pro Ala Pro Ala Ala Pro 65 70 75 80		
Thr Pro Ala Ala Pro Ala Pro Ala Pro Ser Trp Pro Leu Ser Ser Ser 85 90 95		
Val Pro Ser Gln Lys Thr Tyr Gln Gly Ser Tyr Gly Phe Arg Leu Gly 100 105 110		
Phe Leu His Ser Gly Thr Ala Lys Ser Val Thr Cys Thr Tyr Ser Pro 115 120 125		
Ala Leu Asn Lys Met Phe Cys Gln Leu Ala Lys Thr Cys Pro Val Gln 130 135 140		
Leu Trp Val Asp Ser Thr Pro Pro Pro Gly Thr Arg Val Arg Ala Met 145 150 155 160		
Ala Ile Tyr Lys Gln Ser Gln His Met Thr Glu Val Val Arg Arg Cys 165 170 175		
Pro His His Glu Arg Cys Ser Asp Ser Asp Gly Leu Ala Pro Pro Gln 180 185 190		
His Leu Ile Arg Val Glu Gly Asn Leu Arg Val Glu Tyr Leu Asp Asp 195 200 205		
Arg Asn Thr Phe Arg His Ser Val Val Val Pro Tyr Glu Pro Pro Glu 210 215 220		
Val Gly Ser Asp Cys Thr Thr Ile His Tyr Asn Tyr Met Cys Asn Ser 225 230 235 240		
Ser Cys Met Gly Gly Met Asn Arg Arg Pro Ile Leu Thr Ile Ile Thr 245 250 255		
Leu Glu Asp Ser Ser Gly Asn Leu Leu Gly Arg Asn Ser Phe Glu Val 260 265 270		
Arg Val Cys Ala Cys Pro Gly Arg Asp Arg Arg Thr Glu Glu Glu Asn 275 280 285		

Leu Arg Lys Lys Gly Glu Pro His His Glu Leu Pro Pro Gly Ser Thr
 290 295 300

Lys Arg Ala Leu Pro Asn Asn Thr Ser Ser Ser Pro Gln Pro Lys Lys
 305 310 315 320

Lys Pro Leu Asp Gly Glu Tyr Phe Thr Leu Gln Ile Arg Gly Arg Glu
 325 330 335

Arg Phe Glu Met Phe Arg Glu Leu Asn Glu Ala Leu Glu Leu Lys Asp
 340 345 350

Ala Gln Ala Gly Lys Glu Pro Gly Gly Ser Arg Ala His Ser Ser His
 355 360 365

Leu Lys Ser Lys Lys Gly Gln Ser Thr Ser Arg His Lys Lys Leu Met
 370 375 380

Phe Lys Thr Glu Gly Pro Asp Ser Asp
 385 390

<210> 16
 <211> 212
 <212> PRT
 <213> Mus sp.

<400> 16

Met Gln Leu Phe His Leu Cys Leu Ile Ile Ser Cys Ser Cys Pro Thr
 1 5 10 15

Val Gln Ala Ser Lys Leu Cys Leu Gly Trp Leu Trp Gly Met Asp Ile
 20 25 30

Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu Ser Phe Leu
 35 40 45

Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr Ala Ser
 50 55 60

Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys Ser Pro His
 65 70 75 80

His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu Leu Met Thr
 85 90 95

Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Pro Ala Ser Arg Asp
 100 105 110

Leu Val Val Ser Tyr Val Asn Thr Asn Met Gly Leu Lys Phe Arg Gln
 115 120 125

Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg Glu Thr Val
 130 135 140

Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala
 145 150 155 160

Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu Thr Thr
 165 170 175

Val Val Arg Arg Arg Gly Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro
 180 185 190

Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser Arg
 195 200 205

Glu Ser Gln Cys
 210

<210> 17
 <211> 9
 <212> PRT
 <213> Mus sp.

<400> 17

Asp Leu Met Gly Tyr Ile Pro Leu Val
 1 5

<210> 18
 <211> 15
 <212> PRT
 <213> Mus sp.

<400> 18

Gly Tyr Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala Thr Leu
 1 5 10 15

<210> 19
 <211> 13
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<220>

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 <222> (1)..(1)
 <223> Ala is D-alanine.

<220>
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 <222> (13)..(13)
 <223> Ala is D-alanine..

<400> 19

Ala Lys Phe Val Ala Ala Trp Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 20
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 <223> Ala is D-alanine.

<220>
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 <222> (13)..(13)
 <223> Ala is D-alanine.

<400> 20

Ala Lys Tyr Val Ala Ala Trp Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 21
 <211> 13
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<220>
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 <223> Ala is D-alanine.

<220>
 <221> MISC_FEATURE
 <222> (13)..(13)
 <223> Ala is D-alanine.

<400> 21

Ala Lys Phe Val Ala Ala Tyr Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 22
 <211> 13

<212> PRT
 <213> Mus sp.

<220>
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 <222> (1)..(1)
 <223> Ala is D-alanine.

<220>
 <221> MISC_FEATURE
 <222> (3)..(3)
 <223> Xaa is cyclohexylalanine.

<220>
 <221> MISC_FEATURE
 <222> (13)..(13)
 <223> Ala is D-alanine.

<400> 22

Ala Lys Xaa Val Ala Ala Tyr Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 23
 <211> 13
 <212> PRT
 <213> Mus sp.

<220>
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 <223> Ala is D-alanine.

<220>
 <221> MISC_FEATURE
 <222> (13)..(13)
 <223> Ala is D-alanine.

<400> 23

Ala Lys Tyr Val Ala Ala Tyr Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 24
 <211> 13
 <212> PRT
 <213> Mus sp.

<220>
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 <222> (1)..(1)
 <223> Ala is D-alanine.

<220>
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<222> (13)..(13)
 <223> Ala is D-alanine.

<400> 24

Ala	Lys	Phe	Val	Ala	Ala	His	Thr	Leu	Lys	Ala	Ala	Ala
1				5					10			

<210> 25
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 <212> PRT
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<220>
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 <223> Ala is D-alanine.

<220>
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 <222> (3)..(3)
 <223> Xaa is cyclohexylalanine.

<220>
 <221> MISC_FEATURE
 <222> (13)..(13)
 <223> Ala is D-alanine.

<400> 25

Ala	Lys	Xaa	Val	Ala	Ala	His	Thr	Leu	Lys	Ala	Ala	Ala
1				5					10			

<210> 26
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 <212> PRT
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<220>
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 <223> Ala is D-alanine.

<220>
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 <222> (13)..(13)
 <223> Ala is D-alanine.

<400> 26

Ala	Lys	Tyr	Val	Ala	Ala	His	Thr	Leu	Lys	Ala	Ala	Ala
1				5					10			

<210> 27
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<223> Ala is D-alanine.

<220>

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<222> (13)..(13)

<223> Ala is D-alanine..

<400> 27

Ala	Lys	Phe	Val	Ala	Ala	Asn	Thr	Leu	Lys	Ala	Ala	Ala
1					5				10			

<210> 28

<211> 13

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<222> (1)..(1)

<223> Ala is D-alanine.

<220>

<221> MISC_FEATURE

<222> (3)..(3)

<223> Xaa is cyclohexylalanine.

<220>

<221> MISC_FEATURE

<222> (13)..(13)

<223> Ala is D-alanine.

<400> 28

Ala	Lys	Xaa	Val	Ala	Ala	Asn	Thr	Leu	Lys	Ala	Ala	Ala
1					5				10			

<210> 29

<211> 13

<212> PRT

<213> Mus sp.

<220>

<221> MISC_FEATURE

<222> (1)..(1)

<223> Ala is D-alanine.

<220>

<221> MISC_FEATURE

<222> (13)..(13)

<223> Ala is D-alanine.

<400> 29

Ala Lys Tyr Val Ala Ala Asn Thr Leu Lys Ala Ala Ala
1 5 10

<210> 30

<211> 13

<212> PRT

<213> Mus sp.

<220>

<221> MISC_FEATURE

<222> (3)..(3)

<223> Xaa is cyclohexylalanine.

<400> 30

Ala Lys Xaa Val Ala Ala Trp Thr Leu Lys Ala Ala Ala
1 5 10

<210> 31

<211> 13

<212> PRT

<213> Mus sp.

<400> 31

Ala Lys Phe Val Ala Ala Trp Thr Leu Lys Ala Ala Ala
1 5 10

<210> 32

<211> 13

<212> PRT

<213> alternative PADRE peptide

<400> 32

Ala Lys Tyr Val Ala Ala Trp Thr Leu Lys Ala Ala Ala
1 5 10

<210> 33

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<212> PRT

<213> Mus sp.

<400> 33

Ala Lys Phe Val Ala Ala Tyr Thr Leu Lys Ala Ala Ala
1 5 10

<210> 34

<211> 13

<212> PRT

<213> Mus sp.

<220>
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 <222> (3)..(3)
 <223> Xaa is cyclohexylalanine.

<400> 34

Ala Lys Xaa Val Ala Ala Tyr Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 35
 <211> 13
 <212> PRT
 <213> Mus sp.

<400> 35

Ala Lys Tyr Val Ala Ala Tyr Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 36
 <211> 13
 <212> PRT
 <213> Mus sp.

<400> 36

Ala Lys Phe Val Ala Ala His Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 37
 <211> 13
 <212> PRT
 <213> Mus sp.

<220>
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 <222> (3)..(3)
 <223> Xaa is cyclohexylalanine.

<400> 37

Ala Lys Xaa Val Ala Ala His Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 38
 <211> 13
 <212> PRT
 <213> Mus sp.

<400> 38

Ala Lys Tyr Val Ala Ala His Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 39
 <211> 13
 <212> PRT
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<400> 39

Ala Lys Phe Val Ala Ala Asn Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 40
 <211> 13
 <212> PRT
 <213> Mus sp.

<220>
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 <223> Xaa is cyclohexylalanine.

<400> 40

Ala Lys Xaa Val Ala Ala Asn Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 41
 <211> 13
 <212> PRT
 <213> Mus sp.

<400> 41

Ala Lys Tyr Val Ala Ala Asn Thr Leu Lys Ala Ala Ala
 1 5 10

<210> 42
 <211> 13
 <212> PRT
 <213> Mus sp.

<220>
 <221> MISC_FEATURE
 <222> (1)..(1)
 <223> Ala is either D-alanine or L-alanine.

<220>
 <221> MISC_FEATURE
 <222> (3)..(3)
 <223> Xaa is either cyclohexylalanine, phenylalanine, or tyrosine.

<220>
 <221> MISC_FEATURE
 <222> (7)..(7)
 <223> Xaa is either tryptophan, tyrosine, histidine, or asparagine.

<220>
 <221> MISC_FEATURE
 <222> (13)..(13)
 <223> Ala is either D-alanine or L-alanine.

<400> 42

Ala Lys Xaa Val Ala Ala Xaa Thr Leu Lys Ala Ala Ala

<210> 43
 <211> 13
 <212> PRT
 <213> Mus sp.

<220>
 <221> MISC_FEATURE
 <222> (1)..(1)
 <223> Ala is D-alanine.

<220>
 <221> MISC_FEATURE
 <222> (3)..(3)
 <223> Xaa is cyclohexylalanine.

<220>
 <221> MISC_FEATURE
 <222> (13)..(13)
 <223> Ala is amidated D-alanine.

<400> 43

Ala Lys Xaa Val Ala Ala Trp Thr Leu Lys Ala Ala Ala
 1 5 10